

Breaking the barriers for CCS

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U.S. Remains Key Player in Coal

- Currently world's 2nd largest producer and consumer
- 50% of U.S. electricity generation
- Total consumption projected to increase ~30% by 2030



Why aren't we doing CCS now?

A. No policy driver

B. Has not been tested at scale

C. Costs too much

D. NIMBY

Influenced by safety,
environmental protection
and cost

Overcoming barriers

- With demonstration:
 - Technology learning
 - Lower costs
 - Need global demos
- To address social barriers:
 - Need clear rules for environmental protection
 - Need to engage local communities



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\$ per metric ton of CO₂ avoided

	IPCC (\$2002)	MIT (\$2005)	NETL (\$2006)	EPRI (\$2007)
SCPC	\$30- \$71	\$40.4 (+ \$5)	\$75	\$57- \$63
IGCC	\$14- \$53	\$19.3 (+ \$5)	\$43	\$39- \$56

CCS provisions in the ACESA

- Environmental regulations for CCS with formal evaluation every 3-years
- Emissions reporting for geologic storage
- Task force to evaluate legal frameworks
- Funds demonstrations through new Corp.
- Provides bonuses for early deployments
- Sets performance standards for new coal plants

Sets performance standards for new coal-fired plants



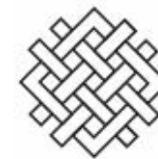
Source: UOP
Brochure

- Plants permitted from 2009-2020 must achieve a 50% reduction in annual emissions by 2025 or earlier
- Plants permitted from 2020 onward must achieve a 65% reduction in annual emissions from the unit

Developing CCS Guidelines for China



清华大学低碳能源实验室
LABORATORY OF LOW CARBON ENERGY
TSINGHUA UNIVERSITY



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China's industry leaders are moving CCS technology now

- **Huaneng:**
 - Approval granted in June for 1st IGCC, 250kw in Tainjin
 - Planned project to capture and reuse 10,000 tons/yr near Shanghai
 - Gaobeidan power station: 3,000 tons/yr near Beijing
- **Shenhua:** plans a to operate a CCS demonstration at a CTL facility in Inner Mongolia within 2 years
- **PetroChina:** pilot projects underway testing CO₂-EOR

CCS

Is not just about **coal**...

It's about **climate change**



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Questions?

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